

REMARKS

Applicants appreciate the thorough and detailed examination of the present application as evidenced by the Office Action. Claims 1-26 are currently pending. Claims 8 and 11 are canceled herein without prejudice, and claims 1, 13 and 19 are amended herein to recite a light phase that includes supercritical carbon dioxide. In addition, claims 1, 4 and 19 are amended herein to address the Examiner's objections. Support for these amendments can be found in the language of original claim 11 and throughout the specification, *e.g.*, at page 6, lines 14-18. Applicants submit that no new matter is introduced by these amendments, and their entry and consideration are respectfully requested.

In light of these amendments and the following remarks, Applicants respectfully request reconsideration of this application and allowance of the pending claims to issue.

Claim Objections

Claims 1-18 stand objected to as allegedly being informal. *Office Action*, page 2.

Applicants have amended claims 1, 4 and 19 in the manner suggested by the Examiner in order to correct the alleged informalities. As such, Applicants believe these objections are now overcome, and Applicants respectfully request that the objections be withdrawn.

Claims 1-7, 9, 10, 12-18 and 19-26 Are Patentable Over Wege In View Of Zehner

Claims 1-18 and 19-26 stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over U.S. Patent No. 6,420,491 to Wege et al. (hereinafter, "Wege") in view of U.S. Patent No. 6,894,193 to Zehner et al. (hereinafter, "Zehner"). *See Office Action*, pages 4-5.

Claims 8 and 11 are canceled herein without prejudice, thus rendering the present rejection moot as it applies to these claims. Therefore, Applicants will only address this rejection as it applies to claims 1-7, 9, 10, 12-18 and 19-26.

Claim 1 is amended herein to recite that the light phase comprises hydrogen and **supercritical** carbon dioxide. The Office Action cites Wege as disclosing a process to hydrogenate an aromatic polymer. However, Applicants believe the Examiner agrees that Wege neither teaches nor suggests a hydrogenation procedure using a combination of hydrogen and carbon dioxide. Instead, the Office Action relies on Zehner as allegedly teaching this feature of the claim. However, Applicants submit that Zehner does not teach or suggest the use of **supercritical** carbon dioxide.

Specifically, Zehner teaches using a hydrogen and an inert **gas**. *See, e.g.*, col. 2, lines 13-18. There is no teaching or suggestion in Zehner to use supercritical carbon dioxide in its hydrogenations. This is also supported by the specific total pressures described in Zehner. In its examples, Zehner only describes the use of *total* pressures (hydrogen plus inert gas) below the critical pressure of carbon dioxide ($P_c = 73.8$ bar). In addition, Zehner describes that the conversion of aromatic nitro compounds into aromatic amines is usually carried out at from 5 to 100, preferably from 10 to 50 bar. *Zehner*, col. 5, lines 17-19. However, Zehner also states that the proportion of inert gas in the hydrogenation reaction is preferably from 3 to 50% by volume, and particularly preferably from 5 to 20% by volume (col. 2, lines 25-38). Therefore, even if the total pressure of the hydrogenation reactions were performed at the maximum of Zehner's total pressure range, *i.e.*, at 100 bar, the carbon dioxide would still be present below its critical temperature.

One of ordinary skill in the art would also not be motivated, based on Zehner, to perform Wege's hydrogenation reactions using supercritical carbon dioxide. Zehner describes that the benefit of the inert gas in its reactions is that the inert gas inhibits the coalescence of the hydrogen gas, which allows for greater mass transfer of the hydrogenation. Zehner teaches away from too high of a concentration of carbon dioxide, stating that in such cases, "the concentration of dissolved hydrogen in the hydrogenation bath may decrease owing to the low partial pressure

of the hydrogen, in spite of the large exchange surface, with the result that the yield of the reaction decreases.” *Zehner*, col. 2, lines 32-35. Therefore, even assuming *arguendo* that one of ordinary skill in the art would combine Wege and Zehner, the combination would not lead one of ordinary skill in the art to the recitation of claim 1.

Therefore, Applicants submit that, for at least the reasons stated above, claim 1 is patentable over Wege in view of Zehner. Additionally, Applicants also submit that dependent claims 2-7, 9, 10, 12-18 are also patentable over Wege in view of Zehner, at least per the patentability of claim 1, from which they depend. Furthermore, for at least the reasons presented with respect to claim 1, Applicants believe claims 19-16 are also patentable over Wege in view of Zehner. As such, Applicants respectfully request that the rejection be withdrawn.

Claims 1-7, 9, 10, 12-18 and 19-26 Are Patentable Over Hucul In View Of Zehner

Claims 1-18 and 19-26 stand rejected under 35 U.S.C. §103(a) as allegedly unpatentable over U.S. Patent No.5,612,422 to Hucul et al. (hereinafter, “Hucul”) in view of Zehner. *See Office Action*, pages 5-6.

Claims 8 and 11 are canceled herein without prejudice, thus rendering the present rejection moot as it applies to these claims. Therefore, Applicants will only address this rejection as it applies to claims 1-7, 9, 10, 12-18 and 19-26.

Claim 1 is amended herein to recite that the light phase comprises hydrogen and **supercritical** carbon dioxide. The Office Action cites Hucul as disclosing a process to hydrogenate an aromatic polymer. However, Applicants believe the Examiner agrees that Hucul neither teaches nor suggests a hydrogenation procedure using a combination of hydrogen and carbon dioxide. Instead, the Office Action relies on Zehner as allegedly teaching this feature of the claim. However, for at least the reasons described above, Applicants submit that Zehner neither teaches nor suggests hydrogenation using supercritical carbon dioxide. As such,

ATTORNEY DOCKET NO. 5051-663
Application Serial No. 10/553.625
Page 9

Applicants submit that claim 1 is patentable over Hucul in view of Zehner. Furthermore, for at least the same reasons provided with respect to claim 1, Applicants submit that claims 2-7, 9, 10, 12-18 and 19-26 are also patentable over Hucul in view of Zehner. Therefore, Applicants respectfully request that the present rejection be withdrawn.

CONCLUSION

Having addressed all of the issues raised by the Examiner in the pending Office Action, Applicants believe that the claims as presented herein are in condition for allowance, which action is respectfully requested. The Examiner is invited and encouraged to contact the undersigned directly in order to expedite the prosecution of the pending claims to issue.

No fee is believed due with this response. However, the Commissioner is authorized to charge any deficiency associated with this filing or credit any overpayment to Deposit Account No. 50-0220.

Respectfully submitted,




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CERTIFICATION OF TRANSMISSION

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Signature: 
Typed or Printed Name of Person Signing Certificate: Carey Gregory